MEMORANDUM

DATE: **June 24, 2014**

TO: **Nick Hetrick, Arcata FWO**

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SUBJECT: **2014 Klamath River Juvenile Chinook Salmon Health Monitoring, *Ceratomyxa shasta* Prevalence Data**

As a component of Klamath River fish health assessment, the California-Nevada Fish Health Center is examining juvenile Klamath River Chinook salmon to monitor the prevalence of *Ceratomyxa shasta* and *Parvicapsula minibicornis* infection. Fish are collected by biologists with the Karuk Tribe, Yurok Tribe, and US Fish and Wildlife Service. The CA-NV Fish Health Center is coordinating disease monitoring efforts and providing laboratory support for the project. In order to provide this data as rapidly as possible, the Center has accelerated QPCR testing for fish collected from the Shasta to Scott (K4) and Scott to Salmon (K3) reaches.

To date, QPCR testing has been performed for fish collected from 30 March through 8 June for the Shasta to Scott (K4) reach and 13 April to 1 June for the Scott to Salmon (K3) reach. Note that 2013 data for both reaches have been included in the graphs to provide a relative comparison of infection onset and prevalence from the previous monitoring year.

Iron Gate Hatchery started releasing hatchery fish into the upper Klamath River on 20 May 2014. All fish collected in K4 have been unmarked, except for week 11 (the week of 8 June) which consisted of only coded wire tagged fish. No coded wire tagged fish have been collected in K3 to date.

Ceratomyxa shasta has been detected in 67.4% (277/411) of fish tested to date. *Parvicapsula minibicornis* data is still pending. Mean *C. shasta* DNA copy number is included in Table 1. Late March and early April sampling in these reaches indicates parasite load in juvenile fish was low despite high numbers of fish being infected. Increased parasite DNA copy numbers in weeks 5, 6, and 7 (27 Apr to 11 May) in the Shasta to Scott (K4) reach are indicative of sub-clinical infection levels in juvenile Chinook salmon.

While few clinical disease signs were observed early in the season (weeks 1-6) during necropsy, clinical signs have been more pronounced in the later weeks, especially week 8-10 in both the K4 and K3 reaches. There have been twelve fish (nine from K4, three from K3) with DNA levels ranging from 115,000-360,000 copies of parasite DNA. These levels indicate clinical ceratomyxosis in individual juvenile Chinook salmon collected in May and early June. All data are preliminary and subject to revision.

Table 1. *Ceratomyxa shasta* prevalence of infection (POI) and mean DNA copy number by Quantitative Polymerase Chain Reaction (QPCR).

Reach	Sample Week	Date	Total Number Samples	Number *C. shasta* Positive	*C. shasta* POI	Mean DNA Copy Number
Shasta to Scott (K4)	1	30 Mar	20	1	5%	11
	2	6 Apr	20	3	15%	8
	3	13 Apr	20	10	50%	29
	4	20 Apr	20	17	85%	172
	5	27 Apr	20	18	90%	47,527
	6	4 May	20	20	100%	43,355
	7	11-May	20	20	100%	51,369
	8	18-May	20	18	90%	32,862
	9	25-May	20	20	100%	523
	10	1-Jun	20	1	5%	37
	11[2]	8-Jun	41	5	12%	3,135
Scott to Salmon (K3)	1	30 Mar	--	NS	NS[1]	--
	2	6 Apr	--	NS	NS	--
	3	13 Apr	20	12	60%	10
	4	20 Apr	20	15	75%	37
	5	27 Apr	20	19	95%	272
	6	4 May	20	19	95%	2,178
	7	11-May	20	19	95%	3,561
	8	18-May	20	19	95%	23,298
	9	25-May	21	19	90%	683
	10	1-Jun	29	22	76%	24,311

[1] NS – Not Sampled.
[2] K4 week 11 consisted of fish that were coded wire tagged

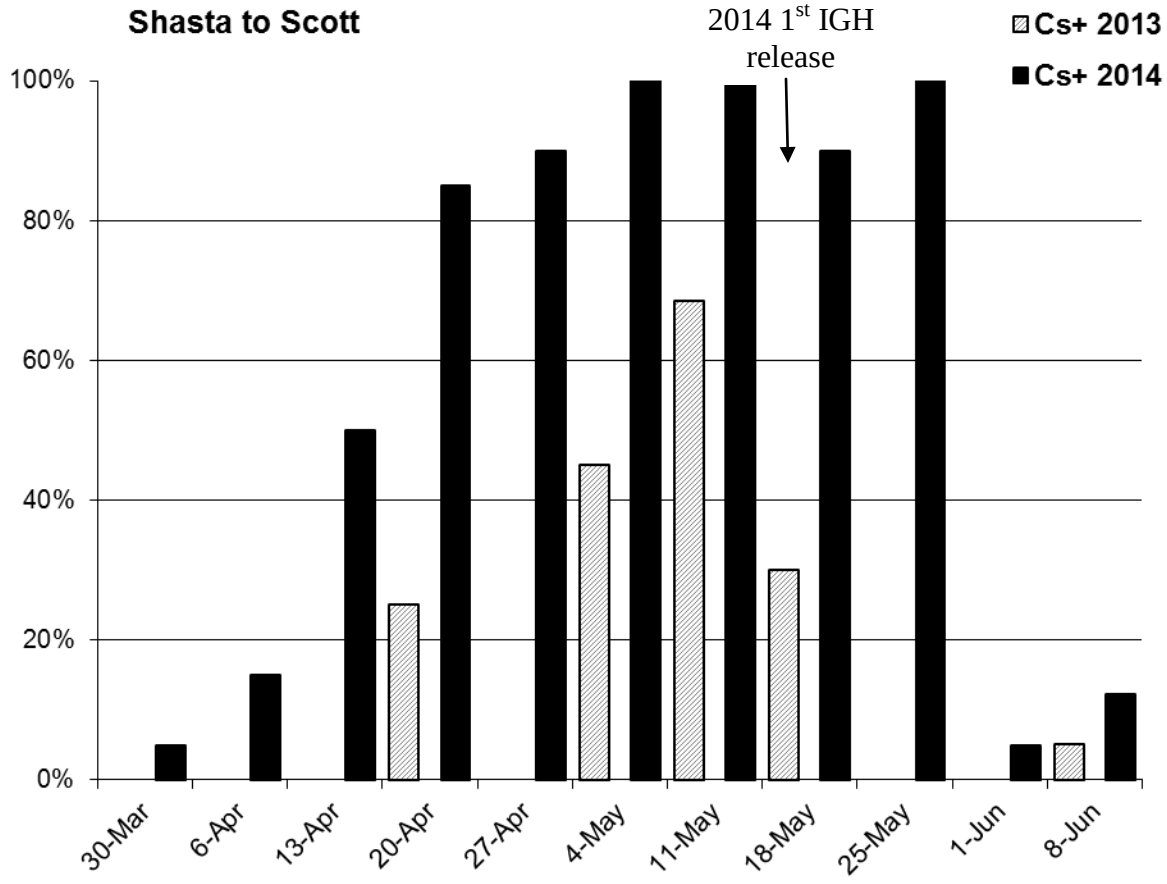

Figure 1. Weekly prevalence of *Ceratomyxa shasta* infection in juvenile Chinook salmon captured in the Shasta to Scott (K4) reach on the Klamath River from 30 March to 8 June. In 2013, twenty fish were sampled for every week shown on the graph, therefore the absence of a bar means that fish were sampled but were negative for *C. shasta*.

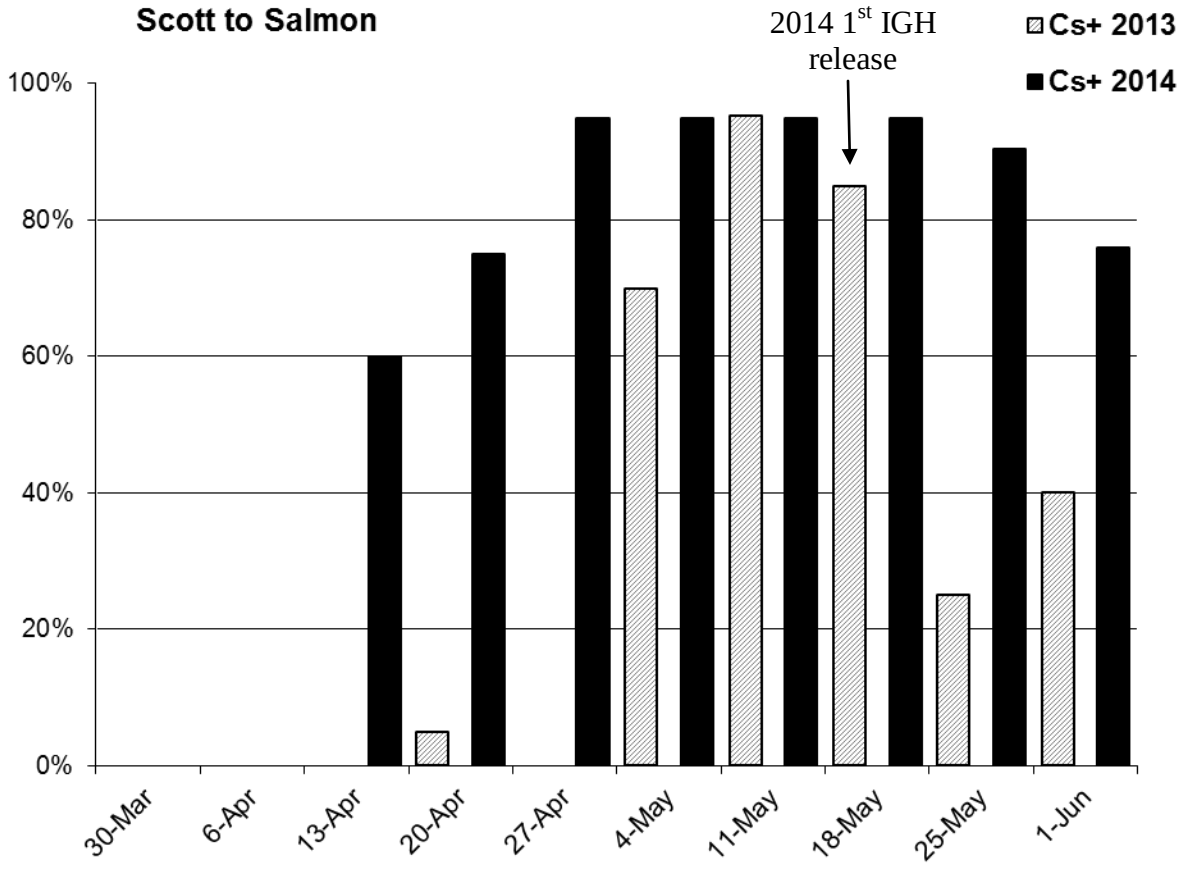

Figure 2. Weekly prevalence of *Ceratomyxa shasta* infection in juvenile Chinook salmon captured in the Scott to Salmon (K3) reach on the Klamath River from 13 Apr to 1 June. Fish were not sampled 30 Mar. In 2013, twenty fish were sampled for all weeks shown on the graph except 30 Mar, therefore the absence of a bar means that fish were sampled but were negative for *C. shasta*.